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The Keel-billed Toucan (*Ramphastos sulfuratus*)

This remarkable species is found in Latin America and is the national bird of Belize. It inhabits rainforests and is about 50cm tall with a large and colourful 20cm beak. Its diet is mainly fruits but occasionally small animals. The beak is made of keratin but hollow and quite light in weight, with thin bony rods for support. The bright pigmentation is thought to be involved in courtship display. The bird is a poor flier and mostly moves by hopping between branches. The toucan family include five genera and over 40 species.

The class of birds display an extraordinary range of design features and generate much interest and support from the public world-wide. Surely we should also be in awe of, and love, their Designer and Creator.

Picture: www.stockphotosecrets.com

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AIMS

To inform Catholics and others of the scientific evidence supporting Special Creation as opposed to Evolution, and to show that the true discoveries of Science are in conformity with Catholic doctrines on Origins.

ACTIVITIES

Daylight Origins Society is a non-profit educational organisation funded from subscriptions, donations and sales of publications.

- Publishes the periodical *Daylight* for subscribers in 20 countries.
- Operates a website at www.daylightorigins.com
- Publishes and distributes pamphlets on Origins issues.
- Provides mail-order service for literature and audio-visual material.
- Promotes links with other Catholic Origins groups worldwide

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EDITORIAL

"A Catholic Perspective on Origins"

This is the sub-title of a superb brand-new DVD series from the Kolbe Center, launched in the USA on December 12th 2019, feast day of Our Lady of Guadalupe, under the title: FOUNDATIONS RESTORED. I have held back this number of *Daylight* until I had received and viewed the entire series (18½ hrs!). More details are to be found on pages 35-36 and inside the back cover. These are some opinions published online in the Kolbe Report of 7th Dec 2019.

Bishop Sanctus Lino Wanok, Bishop of the Diocese of Lira, Uganda, recommended the DVD series in these words:

As the devil strives to immerse and drown the world in darkness and confusion under the guise of science, and as he savagely launches his attacks on the pivotal doctrines of Holy Mother Church, the "Foundations Restored" DVD series casts a bright light which exposes and defeats the camouflaged lie of the Devil. The series offers logical, scientific, philosophical and theological arguments which not only restore the "Creation Providence" account to its proper place, but also liberate the whole realm of natural science from the grasp of its evolutionist hijackers. I therefore recommend the DVD series "Foundations Restored" without reservation for circulation in the public domain so as to combat error and to proclaim the reign of TRUTH.

Similarly, Mother Abbess Cecilia of the Benedictines of Mary wrote:

> *I heartily recommend the DVD series "Foundations Restored," and I am grateful to God and to the Kolbe Center for this powerful means to bring the truth to souls. As the apocalyptic dragon continues to wage war against the truth proclaimed for centuries by Christ's Bride, the very foundations of our Faith are threatened by the all-pervasive lie of evolution. Hugh Owen and his colleagues simply and deftly debunk the evolutionary myth, restoring natural science to its proper position as the humble handmaid of Divine Truth. May this series advance the reign of Christ over our hearts, made in His image and likeness, that we may always follow Him Who is the Way, the Truth and the Life, growing ever more deeply in the knowledge and love of our Creator and Redeemer.* Mother Abbess Cecilia, Benedictines of Mary, Gower, Missouri

Fr. Stephen Imbarrato of Red Rose Rescue fame wrote:

> *"Foundations Restored" is a must see for any Catholic, whether clergy or layperson, who seeks the truth about what the Church has always taught in regard to Genesis and the origins of man and the universe. In today's anti-life culture more than ever, it is paramount that Catholics trust Divine Revelation over scientific speculation.*

As someone who has been following this issue for over forty years, I thought the series covered the subject very well and in a logical, coherent and comprehensive fashion, arguing from philosophy, science, biblical scholarship and Catholic doctrines, with copious documented quotations. In a secondary school setting, the teacher should certainly preview all the sections to ensure their suitability, even at Sixth Form level. The material related to the educational implications of evolutionism was, understandably, more focused on the American experience than that of Europe or the UK. The production was of professional quality and I have no hesitation in endorsing the series.

In a Class (Aves) of their own

While being less cute and cuddly than many mammals, like our favourite cats and dogs, or of such economic importance as cattle, camels, sheep and goats, the group of wild creatures that, arguably, exerts the greatest popularity and fascination for mankind is ‘the birds’. For many of my generation, that phrase immediately conjures up an iconic image of the famous 1963 Hitchcock film; others of more classical bent may think of the 414 BC comedy by Greek playwright Aristophanes, which incidentally contributed the expression ‘cloud cuckoo land’ to the language. Many people since ‘lockdown’ have remarked on the pleasure of hearing bird song lately which would normally be masked by the noise of traffic and aircraft. We greatly appreciate what birds do for us.

The Society for the Protection of Birds (SPB) was founded in 1889 by Emily Williamson for the purpose of combating the destruction of exotic birds for their plumes to decorate hats; at first, only women were admitted. It gained such support that a Royal Charter was granted in 1904. By 1960, there were 10,000 members; it had reached 1 million in 1997.[1]

In this issue, we focus on the variety, design and functions of the bird's beak, which perfectly display creative intelligence but present significant challenges to Darwinian speculations as regards their origins.

Going viral

Until recently, we were perhaps using this expression more metaphorically in terms of the rapid spread of a message or image on the Internet. Now the real version has raised questions about the nature and origin of actual viruses, which connects with the concept of 'spontaneous generation,' which Englishman John Ray attempted to demolish in 1692. A short article in this issue gives an outline answer, but in addition we should be aware that viruses in nature can have beneficial effects in controlling the numbers of bacteria. The problems of disease often result from viruses transferring from animals to humans, or from mutations. In the world before the Fall, there would have been a harmonious balance in nature; following the Curse of the Earth, 'thorns and thistles' were not the only hazards mankind would have to face as a consequence of Original Sin. For a fuller Christian response to the current crisis, see the article '*Coronaviruses in Creation*', by Robert Carter, at www.creation.com

Another milestone and time to take stock

Next year, please God, we shall have completed 30 years of publishing *Daylight* magazine. This is issue 65, a number associated with the phrase 'retirement age.' Your editor is actually eight years ahead of this threshold. I am very grateful for the support from our readership and contributors, a few of whom have actually accompanied us over that whole period. I would like to carry on for another couple of years, but suggest it now might be prudent for you not to renew your subs for more than one year at a time. Meanwhile, if there is an enthusiastic younger person who might consider taking over the magazine, or otherwise replacing its role in a different format, please do get in touch. It appears that *Daylight* continues to be the only Catholic publication of its kind in English worldwide. Our work is not yet done!

[1] For more details, see www.rspb.org.uk

Unexpected Bills

Anthony Nevard

> And God created … every winged fowl according to its kind. And God saw that it was good. And he blessed them, saying: increase and multiply, and fill the waters of the sea; and let the birds be multiplied upon the earth. And the evening and the morning were the fifth day. *Gen: 1: 21-23.*

Of all the vertebrate classes, the birds have colonized the earth more extensively than any other group. Fish, obviously, are largely restricted to freshwater or marine environments. Amphibia, with their moist skins, must stay within reach of water. Reptiles are largely terrestrial, but as they cannot generate their own body heat they are unable to occupy permanently cold regions. Mammals, with their warm blood and fur, though widespread across terrestrial and aquatic habitats, cannot, unaided, colonise remote oceanic islands. But with their feathery wings and high body temperature, conserved by their plumage, most birds are masters of the air, and some are superb swimmers and divers, even in sub-zero waters. Wherever birds are found, they must, of course, obtain food, and one of their distinguishing features is that their jaws are furnished with a horny beak, or bill; beaks illustrate a remarkable variety of shapes and sizes designed to suit their bearers' diet and behavior, well beyond the scope of the natural selection of Darwin's Galápagos finches.

A brief comparison of birds with reptiles

There are some similarities between the structure of birds and that of reptiles. To quote Harvard professor Alfred Romer:

> Birds have been aptly termed "glorified reptiles." We customarily treat of them as a separate class, Aves; but in many regards they are little farther removed from the general reptilian stock than are some of the ruling reptiles from which they sprang. Within that group … was included one series of flying forms, the pterosaurs; the birds are not descended from pterosaurs, but are a second archosaur flying type, in which, instead of membrane, feathers—diagnostic of the class—form the wing surfaces of the modified pectoral limbs. In certain respects, notably bipedal adaptations, the birds are similar to their dinosaurian relatives, but almost every notable bird character is an adaptation to flight. [1]

[1] Romer, A., *The Vertebrate Body*, 3rd edn., (1964), W.B.Saunders Co., p 63.

The legs and feet of birds are covered with scales similar to those covering the bodies of reptiles. Internally there are homologous structures to the skeletons of tetrapod vertebrates, based on the pentadactyl limb design with pectoral and pelvic girdles. The anterior limbs are much modified, and the sternum much expanded with a great keel in flying birds for the attachment of the powerful pectoral muscles. The backbone and tail are modified for bipedal balance and walking, and the feet and claws are variously adapted to the habits and behavior of the species. Many of the bones are hollow, with air sacs connecting with the lungs. The feathers are of several types, including the smaller soft down forming an efficient insulation to conserve heat. Unlike reptiles, birds maintain a high body temperature to allow for fast metabolic reactions and energy release. This requires a double circulatory system with a four-chambered heart, as found in mammals. Much of interest could be added on these subjects, but this article will focus on skulls and beaks.

The basis of the beak is bone

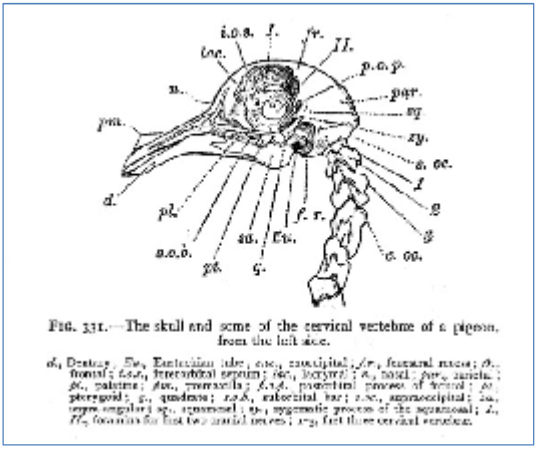


FIG. 331.—The skull and some of the cervical vertebræ of a pigeon, from the left side.

d, Dentary; *Eu*, Eustachian tube; *e.o.c.*, exoccipital; *fr.*, frontal suture; *fr.*, frontal; *i.o.s.*, interorbital septum; *l.c.*, lacrymal; *l.*, nasal; *l.m.*, lacrymal; *pl.*, palatine; *pmx.*, premaxilla; *p.o.p.*, postorbital process of frontal; *pt.*, pterygoid; *q.*, quadrate; *s.o.b.*, sphenoidal bar; *s.oc.*, supraoccipital; *sq.*, squamosal; *sq.*, squamosal; *sq.*, zygomatic process of the squamosal; *I.*, foramina for first two cervical nerves; *II*, first three cervical vertebræ.

The skulls of most birds are notable for their much larger orbits and braincase than those seen in reptiles.[2] This is of course associated with their great dependence on the sense of vision, linked with their modes of motion and feeding, and also on their complex patterns of behaviour. The prominent distinguishing feature of the bird skull is the pair of jaws, covered in life by a horny beak of keratin, which follows closely the shape of the jaws. As with the other skull bones, the upper and lower jaws are made up of several bones joined edgeways by suture joints. The premaxilla and nasal bones enclose the pair of nostrils, which must be aligned with the openings of the beak to allow air to reach the olfactory organs within, which must also be appropriately placed. The jaws must be operated by muscles of suitable size to connect their points of origin and insertion, and the bones must articulate together to facilitate the operation of the beak. The muscles must, of course, also have sufficient blood vessels to supply food and oxygen, and

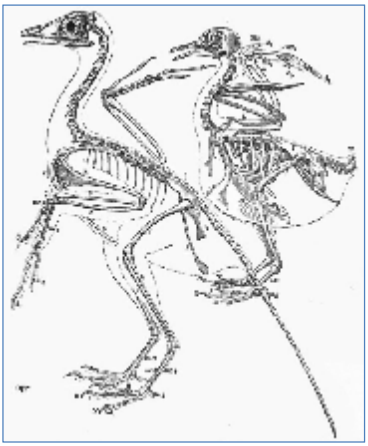
[2] Illustration from Borradaile, L., *A Manual of Elementary Zoology*, 4th edn., (1923), Henry Froude and Hodder & Stoughton, p.446.

nerves to transmit impulses from the brain. In addition, the beak encloses a tongue which contributes to the process of ingestion of food; this may be considerably modified in length and flexibility, such as in humming birds and woodpeckers, very different from the much shorter and thicker organ as found in, for example, a parrot.

There is a principle in molecular biology known as "one gene—one enzyme" for which Beadle and Tatum won the Nobel Prize in 1948. Essentially this means that a single gene of DNA will only encode the production of a single protein, and therefore one enzyme (the biological catalysts that control synthesis of proteins). [3] The proteins and other materials constituting the makeup of bones, keratin, blood vessels, muscle and nerve are all different, so for significant inheritable changes in DNA to result in the evolution of a completely different beak would require the selection of simultaneous random beneficial mutations in numerous genes for different organs and tissues. Not to mention the accompanying modifications in other body parts such as wings and feet!

Speculations on the evolution of birds

Class Aves includes over 150 families and about 10,000 species. Owing to the delicacy of their skeletons, birds appear relatively rarely in the fossil record. The famous *Archaeopteryx* is attributed to 'late Jurassic – 150 MY ago'. It had feathers and shows tiny teeth in the jaws, whereas modern birds are toothless. Teeth would add weight to the body and tend to be a disadvantage for flight. While these birds appear to have some reptilian features, their ancestry is unknown and there is no proof that they are ancestors of modern birds.



Drawing of *Archaeopteryx* skeleton compared with pigeon

[Heilmann; public domain]

Fossils from Cretaceous chalk beds in

[3] More recent genetic studies shows this is not an absolute principle, but just a few DNA mutations could not bring about radical improvements in several different proteins at once.

Kansas named *Ichthyornis* and *Hesperonis* are toothed types said to be intermediate between *Archaeopteryx* and modern birds. Romer comments that:

> The incomplete glimpse which they give us of Cretaceous bird life at least shows us that the radiation of the group must have been far under way at this time to have already produced such dissimilar forms. [4]

So according to the evolutionary time scale, locked into the supposed geological ages, the ancestors of the major orders of birds 'must have' arisen over 100 MY ago. However, in discussing later fossils, Romer admits that the actual evidence is sparse and fragmentary ─

> This leads to great difficulties in attempting to work out the paleontological history of the group, for the birds of today, despite their varied plumage, are very similar to one another in their structure ... The different orders have, in general, no more differences between them than exist between families in other classes of vertebrates, and, anatomically, generic differences are so slight that fossils are very hard to place. [5]

A very interesting aspect of the variety of bird life is that of the flightless birds (ratites), found today in such forms as the ostrich, emu and kiwi, and also fossil types such as elephant birds (*Aepyornis*) of Madagascar and the moas of New Zealand. Like the dodo of Mauritius, such types are often associated with islands, and their extinction may have resulted from hunting by man. They are classified in a superorder Palaeognathae [based on palate structure], having a reduced wing skeleton, flight feathers and pectoral muscles, lacking a keel on the sternum, and having powerful leg muscles for running. Theories conflict as to whether these types actually descended from flightless ancestors or if they lost the power of flight over time. There is no lack of speculation involving the possible effects of island isolation, changing habitats, competition or differential predation on the favourable selection of ground-dwelling birds. However, the fossil evidence for such evolution is absent; for example, kiwi fossils share the long bill and small eyes of modern forms, with no evidence of transitional forms. If flightlessness 'evolved' at all, this might be accounted for by the survival of deleterious mutant forms. Selection of mutations is not capable of creating novel genetic codes for new designs. [6]

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[4] Romer, A., *Vertebrate Palaeontology*, 2nd Edn. (1945), University of Chicago Press, p.263

[5] *Ibid*., p. 265.

[6] For a detailed treatment of the non-evolution of birds, I recommend Sodera, Dr V., *One Small Speck to Man: the Evolution Myth*, 2nd Edn (2009), pp 153-158, 266-317.

EXTINCT BIRDS COMPARED TO AN OSTRICH

The existing ostrich is marked **X**. 1. *Archeopteryx, the ancestral bird.* 2. *Diatryma with a primitive horse in its beak.* 3. *Great cariama.* 4. *Dodo: a modern species lived in Mauritius until the latter half of the 17th century.* 5. *Solitaire.* 6. *Inva.* 7. *Odontopteryx.* 8. *Gannet.* 9. *Wingless diver.*

This drawing illustrates the range of sizes of some extinct birds compared with the ostrich. [7] Calculations of the relationship between the muscle power needed for flapping flight and the body weight shows that the maximum size limit for a flying bird would be little above that of a swan, condor or albatross.

[7] Wheeler, H. (Ed.), *The Miracle of Life*, Odhams Press (1938), p.49

Classification orders and families of birds (simplified)			
ORDER	***FAMILIES***	***Approx. no. of Species***	***Examples***
Struthioniformes	Struthionidae	1	Ostrich
Rheiformes	Rheidae	2	Rheas
Casuariiformes	Casuariidae	3	Cassowaries
Dinornithiformes	Dinornithidae	22	Moas [all extinct]
	Anomalopterygidae		
Apterygiformes	Apterygidae	3	Kiwis
Aepyornithiformes	Aepyornithidae	11	Elephant birds [ext.]
Tinamiformes	Tinamidae	45	Tinamous
Sphenisciformes	Spheniscidae	16	Penguins
Gaviiformes	Gaviidae	4	Divers or loons
Podicipediformes	Podicipedidae	10	Grebes
Procellariiformes	Diomedeidae	14	Albatrosses
	Procellariidae	55	Shearwaters
	Hydrobatidae	20	Storm petrels
	Pelecanoididae	4	Diving petrels
Pelecaniformes	Pelecanidae	7	Pelicans
	Sulidae	9	Gannets & boobies
	Phaethontidae	3	Tropic birds
	Phalacrocoracidae	29	Cormorants
	Fregatidae	5	Frigate birds
	Anhingidae	4	Darters
Ciconiiformes	Ardeidae	60	Herons & bitterns
	Scopidae	1	Hammerhead
	Balaenicipitidae	1	Whale-headed stork
	Ciconiidae	17	Storks
	Threskiornithidae	31	Spoonbills & ibises
	Phoenicopteridae	5	Flamingos
Anseriformes	Anatidae	147	Ducks, geese, swans
	Anhimidae	3	Screamers
Galliformes	Megapodiidae	9	Megapodes
	Cracidae	42	Guans, curassows
	Tetraonidae	16	Grouse
	Phasianidae	180	Pheasants, partridge
	Numididae	7	Guinea fowl
	Meleagrididae	2	Turkeys

ORDER	***FAMILIES***	***Approx. no. of Species***	***Examples***
Gruiformes	12 families of ground-feeders	c. 100	Inc. cranes, rails, bustards
Charadriformes	17 families, mostly waders and shorebirds.	c. 220 [great auk extinct]	Inc. oystercatchers, Avocets,gulls, terns, skuas, auks.
Columbiformes	Pteroclididae	16	Sand grouse
	Raphidae	3	Dodo [ext.]
	Columbidae	300	Pigeons & doves
Psittaciformes	Psittacidae	330	Parrots
Cuculiformes	Musophagidae	22	Turacos
	Cuculidae	128	Cuckoos, anis.
	Opisthocomidae	1	Hoatzin
Strigiformes	Strigidae	124	Owls
	Tytonidae	10	Barn owls
Caprimulgiformes	5 families	c. 95	Nightjars, oilbirds
Apodiformes	Apodidae	80	Swifts
	Hemiprocnidae	3	Crested swifts
	Trochilidae	320	Humming birds
Coliiformes	Coliidae	6	Mousebirds
Trogoniformes	Trogonidae	35	Trogons
Coraciiformes	9 families	c. 190	Kingfishers, bee-eaters, rollers, hoopoe, hornbills.
Piciformes	Galbulidae	15	Jacamars
	Bucconidae	30	Puffbirds
	Capitonidae	76	Barbets
	Indicatoridae	15	Honeyguides
	Ramphastidae	40	Toucans
	Picidae	200	Woodpeckers
Passeriformes	63 families of passerines (perching birds).	c. 5200	Lyrebirds, wagtails, swallows, wrens, thrushes, tits, crows, finches, blackbirds, birds of paradise.

Data Source: Brook & Birkhead, *The Cambridge Encyclopaedia of Ornithology*, Cambridge University Press (1991), pp. 86-120.

Back to beaks

The illustration and table on the previous pages are included here to provide context for the case that:

(a) there is a great variety of beak forms among the many orders of birds;
(b) much variability is found within as well as across the orders;
(c) there is no pattern or progression of beak forms in relation to extinct species;
(d) there is no fossil evidence to establish common ancestry across the orders;
(e) there is no agreement among experts as to the theoretical evolutionary connections between bird families.

Readers who may feel some of the references in this article are somewhat dated might care to consult the more recent internet article on this subject https://en.wikipedia.org/wiki/Evolution_of_birds which confirms that there continues to be considerable controversy over the inter-relationships of bird orders, and their possible ancestry. Molecular biology has employed a technique called DNA-DNA hybridization to try to determine how closely related species 'really are.'

> Generally DNA-DNA hybridization confirms the picture established by traditional taxonomy. [8] Where the two approaches yield different answers it is not possible (in the absence of a more detailed fossil record) to say which answer is 'right'. [9]

Beaks share a similar underlying structure but their varied forms are most associated with the bird's feeding habits. The theory that birds lost their teeth during evolution to reduce their weight for flying overlooks the fact that extinct birds like ichthyornis seem to have been able to fly even with teeth, as do modern bats. Birds with enormous beaks like toucans and pelicans can fly, as can eagles carrying more than their own body weight. The beak grows continually from the epidermis, forming a layer called the rhamphotheca; in some species there are seasonal colour variations, or extra parts grow during the breeding season and are later shed. Since the bird's forelimbs are wings, the bill is employed both as a mouth and as 'hands'. The latter includes gathering and arranging nest material, turning eggs, controlling chicks, preening feathers, defence against predators, and courtship behaviour. The chicks of most birds grow an 'egg tooth' on the bill which helps them crack open the shell.

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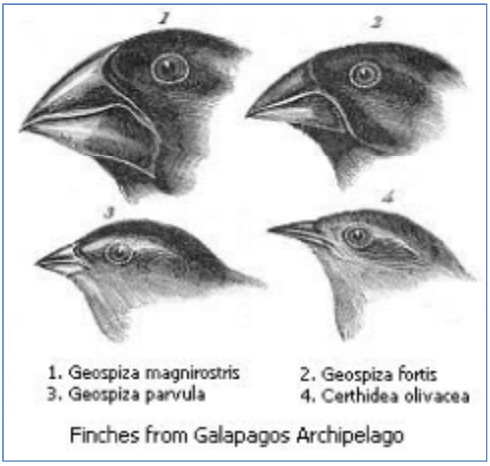
[8] A system established by the end of the nineteenth century, based mainly on the work of German anatomists Furbringer and Gadow. They used about 40 characters to identify relationships, including palate structure, the sternal keel, thigh muscles, toe tendon arrangements, feather arrangements, the presence of an oil gland, and the syrinx structure. *Ed*.

[9] Brooke & Birkhead, *op.cit*.

The famous finches of the Galápagos archipelago

A star performer on the stage of supposed evidences of 'evolution in action' is the alleged selection of beak shapes in Galápagos finch species in relation to their diets, as noted in Charles Darwin's journal. It may be of interest to quote the relevant passage here (just after he had described some other birds):



Finches from Galapagos Archipelago

> The remaining land-birds form a most singular group of finches, related to each other in the structure of their beaks, short tails, form of body and plumage; there are thirteen species, which Mr Gould has divided into four sub-groups. All these species are peculiar to this archipelago; and so is the whole group, with the exception of one species of the sub-group Cactornis, lately brought from Bow Island, in the low Archipelago. Of Cactornis, the two species may be often seen climbing about the flowers of the great cactus-trees; but all the other species of this group of finches, mingled together in flocks, feed on the dry and sterile ground of the lower districts. The males of all, or certainly of the greater number, are jet black; and the females (with perhaps one or two exceptions) are brown. The most curious fact is the perfect gradation in the size of the beaks in the different species of Geospiza, from one as large as that of a hawfinch to that of a chaffinch, and (if Mr Gould is right in including his sub-group Certhidea, in the main group) even to that of a warbler. The largest beak in the genus Geospiza is shown in Fig.1, and the smallest in Fig.3; but instead of there being only one intermediate species, with a beak of the size shown in Fig.2, there are no less than six species with insensibly graduated beaks. The beak of the sub-group Certhidea, is shown in Fig. 4. The beak of Cactornis is somewhat like that of a starling; and that of the fourth sub-group, Camarhynchus, is slightly parrot-shaped. Seeing this gradation and diversity of structure in one small, intimately related group of birds, one might really fancy that from an original paucity of birds in this archipelago, one species had been taken and modified for different ends. [10]

The first edition of *Journal of Researches…* came out in 1839, but Darwin expanded on the finches in his second edition in 1845. He had become more convinced of the evolutionary history of the flora and fauna of the 13 islands as

[10] Darwin, C., *The Voyage of the 'Beagle'*, (1890), John Murray, p. 363-4. Dr A. Gould was a distinguished American naturalist who co-wrote *Principles of Zoology* with Louis Agassiz.

he had discovered the frequent incidence of various species that were endemic to them [i.e. restricted to one geographical region].

> The high degree of endemism … is particularly suggestive of their evolutionary origin on the islands; so too is the presence of many closely related species within several groups—the finches are the best known case, but the same is true of tortoises, lizards, and many plants … The fact could most easily be explained by the evolution of the related species from a common ancestor on the islands. [11]

These observations of finches on the Galápagos clearly provide strong circumstantial evidence for microevolution, yet they do not appear explicitly described in Darwin's *Origin of Species* in 1859.[12] Alfred Wallace, in explaining Darwinism, also writes about the birds of the oceanic islands:

> In the Galapagos the land-birds are still more numerous [compared with the Azores], due in part to their larger area and greater proximity to the continent, but chiefly to the absence of storms, so that the birds which originally reached the islands have remained long isolated and have developed into many closely allied species adapted to the special conditions. All the species of the Galapagos but one are peculiar to the islands, while the Azores possess only one peculiar species, and Bermuda none—a fact which is clearly due to the continual immigration of fresh individuals keeping up the purity of the breed by intercrossing. In the Sandwich Islands, which are extremely isolated, being more than 2000 miles from any continent or large island, we have a condition of things similar to what prevails in the Galapagos, the land-birds, eighteen in number, being all peculiar, and belonging, except one, to peculiar genera. These birds have probably all descended from three or four original types which reached the islands at some remote period, probably by means of intervening islets that have since disappeared. [13]

Still in the late 19th century, George Romanes, of Cambridge University, gave a series of lectures in support of Darwinism, later published as a book. He stressed the significance of the Galapagos archipelago to the theory:

> This group is of particular interest, from the fact that it was the study of its fauna which first suggested to Darwin's mind the theory of evolution. [14]

This book is clearly throughout an open polemic against 'special creation' and Darwin's human opponents, including Agassiz, Owen and Wallace. His phrase

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[11] Ridley, M. (Ed.), *The Essential Darwin*, Unwin Paperbacks (1987), p. 45.

[12] There is one page in *Origin* referring to endemic birds on Galápagos: "There are 26 land-birds; of these 21 (or perhaps 23) are peculiar, whereas of the 11 marine birds only 2 are peculiar." [*Origin of Species*, 6th Edn., p.543]

[13] Wallace, A.R., *Darwinism*, 2nd Edn., Macmillan (1897) p. 358.

[14] Romanes, G.J., *Darwin, and After Darwin*, Longmans, Green, and Co., 2nd Edn., (1897), p. 227.

'the fact of evolution' is prominent from the start. In the chapter entitled 'Geographical Distribution,' he acknowledges Wallace's "magnificent contributions" to scientific research in this area. On the subject of the oceanic islands, Romanes opines that they:

> … may be metaphorically regarded as having been formed by nature for the particular purpose of supplying naturalists with a crucial test between the theories of creation and evolution. [15]

He proceeds to cite examples such as wingless beetles peculiar to the island of Madeira: "Evolutionists explain this remarkable fact by their general laws of degeneration under disuse, and the operation of natural selection." [*ibid*., p.226] Nowadays we do not find such ideas unacceptable, but the writer's sarcastic comments show that his concept of special creation is tied to that of the absolute fixity of species since Day 6 of Genesis. Such a misconception of the creation model is still frequently met with today, when the evolutionist affects not to understand or accept the distinction between the concepts of *micro*-evolution (within the created kind, or baramin) and *macro*-evolution (the molecules-to-man scenario). It is no surprise to read that Romanes, brought up a Christian, attributed his lapsation to agnosticism to the theory of evolution.

Finch 'evolution' and modern creation science

The publications of Darwin and Wallace put Galápagos centre-stage as a natural laboratory for studying evolution, initially through expeditions involving killing and collecting thousands of specimens. In 1938, David Lack went there hoping to observe finches' breeding habits. He later studied collections of finches in the USA and measured 8000 beaks. He concluded that types with beak differences could both survive on the same island owing to their different diets, which meant they did not compete for the same food. His book, published in 1947, was called: 'Darwin's Finches'.

Important research continued in 1973 when Peter and Rosemary Grant began an 18-year study to observe natural selection in action. They observed that changes in the population did occur following a drought in 1977.

> In the severe drought, the finches were all struggling to find food and the smaller, softer seeds were soon all eaten up; only larger, harder seeds were now left. Birds with big beaks to crack hard seeds survived; birds with small beaks died. In the next breeding season, when the rains returned, the big-beaked birds bred and passed on their big beak genes to the next generation; by 1978 the average size of a

[15] Romanes, *ibid.*, p.223

> medium ground finch's beak had grown. [16]

More favourable weather conditions in 1982-3 resulted in an abundance of seed production and a long breeding season.

> Bird numbers rose and outstripped the island's resources, but it was big-beaked birds eating big seeds that suffered most. The average beak size got smaller […] At last evolution by natural selection had been seen in action in Galápagos. [17]

Based on the observed rate of change of beaks in differential survival, it was estimated that a new species could evolve every 200 years. Referring to an article in *Scientific American* (Oct 1991), Dr Carl Weiland reports:

> At that observed rate, Grant estimates, it would take only 1,200 years to transform the medium ground finch into the cactus finch, for example. […] Notice that such speedy changes can have nothing to do with the production of any new genes by mutation […] It is real, observed evidence that such (downhill) adaptive formation of several species from the one created kind can easily take place in a few centuries. It doesn't need millions of years. The argument is strengthened by the fact that, after the Flood, selection pressure would have been much more intense — with rapid migration into new, empty niches, residual catastrophism and changing climate as the earth was settling down and drying out, and simultaneous adaptive radiation of differing food species. [18]

More recent research, described in a 2012 article in *Journal of Creation* by Jean Lightner, has established that the depth and width of the beak are related to the expression of a gene ***Bmp4*** during chick development. This gene influences prenasal cartilage formation according to the time, place and degree to which this occurs. Other studies show the influence of the calcium-binding protein calmodulin that affects beak length. The changes in finch populations on different islands appear to have resulted from bird behavior in respect of migration and hybridization, not simply from natural selection. However, Jean Lightner stresses that other factors may interact:

> In addition to the behaviour of the birds affecting the pattern of traits in a population, there could also be genetic or epigenetic factors which affect them (e.g. gene conversion, heritable epigenetic changes, phenotypic plasticity). [19]

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[16] Quoted in Stewart, Paul D., *Galápagos – the islands that changed the world*, BBC Books (2006), p. 82.

[17] Ibid., p.83.

[18] Wieland, C., "Darwin's finches: evidence supporting rapid post-Flood 'adaptation'", *Creation Ex Nihilo*, Vol. 14, No. 3, June-August 1992, p.23.

[19] Lightner, J., Finch beaks point to a Creator who provides, *Journal of Creation* **26**(2): 8–10, August 2012. https://creation.com/finch-beaks

As was expounded earlier in this article, these inbuilt and coordinated mechanisms can only contribute to understanding *modifications* of beak size and shape, not to explain the *origin* of beaks as such. Nor do they account for the integration of beak design with other physical features of bird anatomy, physiology and behavior related to their diet and habits.

> Though these findings were interpreted within an evolutionary worldview, they don't support the conjecture that beaked finches evolved from a beakless ancestor. Certainly there is evidence that the birds have adapted to different niches because the shape of the beak can vary between individuals. Changing the final beak shape requires that all the information for beak formation already be in place. Not only must the beak be able to form, but it must be properly integrated with the rest of the body so as to be functional. All this suggests considerable planning and foresight was involved in the design of beak formation in birds. [20]

Some illustrations of beak adaptations

For a comprehensive, informed and readable survey of the variety of bird life, I cannot resist recommending *The Life of Birds* by Sir David Attenborough. In the chapter about bird feeding, he points out the benefits of seeds as a rich and compact food source to minimize bulk and weight. Predictably, the author assumes that evolution produced the birds' adaptations for feeding:

> The variety and versatility of tools that birds might use for this purpose is greatly reduced by the modifications made for flight so many millions of years ago. Front legs transformed into wings can no longer grasp and rip. And a horny beak is not nearly so good at chewing and grinding as a pair of bony jaws armed with powerful teeth. All a beak can do, mechanically, is open and close.
>
> Nevertheless, it is extraordinary how versatile and effective a beak can be. Keratin, the substance from which it is made, seems to be easily moulded by evolutionary pressures. Consider the finches. [21]

And the text continues with a brief survey of the adaptations of finch bill shapes in relation to the toughness of the seed shells of their diet, and then seamlessly to those of other birds such as crossbills, jays and woodpeckers, and thence to anything from owls to ostriches. But we would argue that the selective adaptation of beak shapes among the finch family fails to account for the origins of the beak itself, or of the great variety seen in other bird families.[22]

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[20] Lightner, *ibid*.

[21] Attenborough, D., *The Life of Birds*, BBC (1998), p. 71.

[22] The popularity and fascination engendered by this class of creatures is exemplified by the section on birds in *Wood's Natural History*, first published in 1852. My copy is the nineteenth edition of 1892. The Aves occupy pages 164 – 325, out of 437 pp of text (about 37%).

Here are a few examples, with brief comments: [23]

Woodpecker

There are about 170 species of woodpeckers, supremely adapted for tree-trunk-based lives. The strong beak encloses a very long sticky tongue, supplied by enlarged salivary glands, to catch ants and other insects. Their skull is thick-walled to absorb shocks involved in pecking into wood, and the stiffened tail props the bird as it ascends the trunk.

Humming bird

About 300 species, related to swifts; as young nestlings, their beaks are short with a wide gape, but they then develop the highly specialized features of beak and tongue adapted for their diet. They have short legs but specially large pectoral muscles to enable lift on both up and down strokes, so allowing them to hover in flight. Some catch insects; others have a very long thin beak perfectly suited to drawing nectar from the long tubes of certain flowers. In the process, the bird assists the pollination of that species of flower. The swordbill of South America has a remarkable 3-inch long beak even longer than its body.

Stork

Larger birds like storks and herons are generally meat-eaters, and many associate with water where they catch fish or amphibians using their long, strong bills. Storks

comprise about 20 species and are widespread in continental Europe, Asia and Africa. Their beaks also enable them to carry and manipulate sticks to build their nests, sometimes on house roofs. Some species are valued as being efficient scavengers.

[23] Another very popular publication was *The Standard Natural History from Amoeba to Man*, edited by W. Pycraft, first published by Warne in 1931. Pycraft was particularly interested in birds, and this section comprises 23% of over 900 pages covering the whole animal kingdom.

Pelican

The seven species of pelicans are notable for the great pouch under the beak into which they scoop water and prey when feeding. Not only do they have powerful flight, they can then dive into the sea to catch fish and squid. The nostrils in the beak are very small to prevent entry of water. In the breeding season, the N. American 'Rough-billed' pelican develops a large crest on its horn which it loses at the end of the season.

Flamingo

The beak of the flamingo is unique in shape, having upper and lower jaws bent across the middle. When feeding, the bird wades through the water with its head inverted and lower jaw uppermost, using bristle within to filter out small organisms which it swallows. The planktonic algae are rich in carotenoids which they need to colour their brilliant pink beak and plumage.

Parrot

Parrots are relatives of macaws, cockatoos and budgerigars. Most are vegetarian, eating nuts, fruits and seeds. The curved upper mandible fits over the shorter lower one, and the strong jaw muscles enable a powerful bite. However, using their toes to manipulate food, they can employ their beak with much 'manual' dexterity.

Eagle

Eagles are related to hawks, buzzards, kites, falcons and vultures making a group broadly known as 'Birds of Prey.' They are superb fliers and the tips of their beaks are typically sharply curved downwards. In combination with their talons, they are highly effective at killing and eating meat; some members of the tribe may hunt mammals, others amphibian or reptiles, even other birds. The vultures are particularly valuable as scavengers, largely feeding on carrion.

Owl

Although suited to a similar variety of diet (though more rarely carrion) to that of the eagle family, the bill of the owl is much smaller; their distinguishing feature is the flatter 'face' with forward-looking eyes, enabling effective binocular vision, which facilitates nocturnal hunting. Their highly sensitive ears are placed asymmetrically on the head, and the ruffs of feathers help to focus sound waves. This is believed to assist their super-stereo listening ability. Owls swallow small prey whole, macerating their bodies at their leisure in the gizzard. Indigestible parts of their food such as bones and feathers are regurgitated as 'owl pellets' on the ground, from examining which we can analyse the components of their diet.

Some other ways that birds' beaks 'fit the bill'

Specialisation of beak shape for diet is notable in the cross-bill finch, in which the mandible tips overlap; their owner inserts the implement between the scales of a pine cone and levers them apart to release the seed. However, this beak shape does not allow the bird to pick up seed from the ground. The skimmer, related to terns, has a longer lower mandible than the upper. It flies low over the water with the lower mandible slicing through the surface. When prey (usually fish) is struck, the jaws snap shut to enclose it. Skimmers have extra strong neck muscles to absorb the shock. The spoonbill [shown], found on all continents, is a wading bird that filters out food from the water with sideways sweeps of its broad beak. Its nostrils are placed near the base of the bill to enable breathing to continue while feeding. [24]

Breaking out

While we have seen numerous examples of birds' distinctive beaks related to their diets, the first task they have to perform is cracking open their egg shell. In most birds, this is performed using a tough growth called the 'egg tooth' on the end of the beak that

[24] Spoonbill Photo – Wikipedia Creative Commons.
Other photos on pp 17-19 are from royalty-free images on various CD collections.

protects the sharp tip below, and disappears soon after hatching.[25] Such a structure is also found on the jaws of lizards, snakes and crocodiles which also hatch from eggs.

Later, when the chicks are being fed, their beaks open very widely (the gapes) to receive food from the parent. Research shows that the young birds may be responsive to the coloured markings on their parents' bills, pecking at them to encourage release of food.

Multi-purpose beaks

The avian bill displays versatility well beyond simply the needs of nutrition. The beak is used for preening and cleaning the feathers, for collecting and arranging nest materials, in courtship displays, for turning eggs in the nest and in managing the nestlings. A few species use their beaks in a less direct way to obtain food. The Song Thrush cracks the shells of snails using a rock as an anvil. Egyptian vultures pick up stones and drop them onto Ostrich eggs to break them open. The cactus finch uses a cactus spine to probe the bark of trees and disturb insects into catching range. Corvids such as crows can manipulate twigs and sticks with their beaks to employ them as tools.

Conclusion

We read in Genesis that, forty days after the mountain tops appeared as the waters abated following the Deluge, Noah sent out a raven and a dove: the dove returned, and after seven more days he sent her out again from the ark.

> *"And she came to him in the evening, carrying a bough of an olive tree with green leaves, in her mouth."* [Gen. 8:11]

We commemorate that event as the emblem of peace – the dove also being symbolic of the Holy Ghost – thanks to the loving wisdom and providence of our Creator. Birds' bills, along with their feathers, wings, sensory systems and behavior provide strong evidence of Intelligent Design, not of evolution.

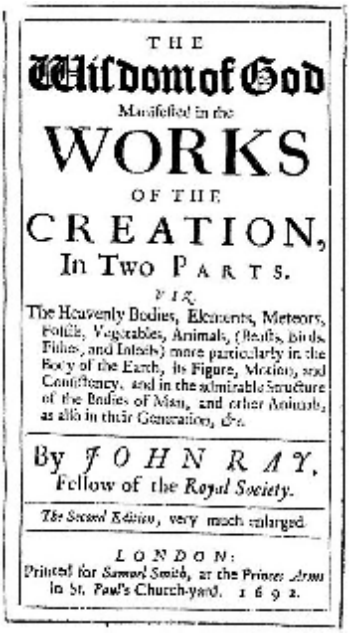
> *But ask now the beasts, and they shall teach thee; and the birds of the air, and they shall tell thee […]*
>
> *Who is ignorant that the hand of the Lord hath made all these things?* [Job 12: 7,9]

[25] Chick of frigate bird. Smithsonian Institution @ Flickr Commons.

The Wisdom of God Manifested in the Works of the Creation

John Ray (1692)

Passages edited from the section dealing with the notion of Spontaneous Generation (pp 298-326) [1]


THE
Wisdom of God
Manifested in the
WORKS
OF THE
CREATION,
In Two PARTS.
VIZ.
The Heavenly Bodies, Elements, Meteors, Fossils, Vegetables, Animals, (Beasts, Birds, Fishes, and Insects) more particularly in the Body of the Earth, its Figure, Motion, and Consistency, and in the admirable Structure of the Bodies of Man, and other Animals, as also in their Generation, &c.
By JOHN RAY,
Fellow of the Royal Society.
The Second Edition, very much enlarged.
LONDON:
Printed for Samuel Smith, at the Prince Arms in St. Paul's Church-yard. 1692.

Another Observation I shall add concerning Generation, which is of some moment, because it takes away some Concessions of Naturalists that give countenance to the Atheists' fictitious and ridiculous Account of the first production of Mankind, and other Animals, viz. that all sorts of Insects, yea, and some Quadrupeds too, as Frogs and Mice, are produced spontaneously. My Observation and Affirmation is, that there is no such thing in Nature, as Equivocal or Spontaneous Generation, but that all Animals, as well small as great, not excluding the vilest and most contemptible insect, are generated by Animal Parents of the same Species with themselves; that Noble Italian Virtuoso, Francisco Redi, having experimented, that no putrified Flesh (which one would think were the most likely of any thing) will of itself, if all Insects be carefully kept from it, produce any. The same Experiment, I remember, Dr. Wilkins, late Bishop of Chester, told me, had been made by some of the Royal Society. No Instance against this Opinion doth so much puzzle me, as Worms bred in the Intestines of Man, and other Animals. But Seeing the round Worms do manifestly generate, and probably the other Kinds too, it's likely they come originally from Seed, which how it was brought into the Guts, may afterwards possibly be discovered.

[Ray continues with a description of the experiment of Malpighius, which demonstrated that plants would only emerge from earth if seeds were present. In some cases, these were known to be viable for "more than a Man's Age."]

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[1] Spelling and punctuation retained here as in the original text.
For more details on John Ray, please refer to *Daylight* #64, pp 21-27. *Ed.*

And, indeed, a Spontaneous Generation of Animals and Plants, upon due Examination will be found to be nothing less than a Creation of them. For after the Matter was made, and the Sea and dry Land separated, how is the Creation of Plants and Animals described but by a commanding, that is, effectually causing the Waters and Earth to produce their several Kinds without any Seed? Now Creation being the Work of Omnipotency, and incommunicable to any Creature, it must be beyond the Power of Nature or natural Agents, to produce things after that manner. And as for God Almighty, He is said to have rested from His Work of Creation after the Seventh Day. But if there be any Spontaneous Generation there was nothing done at the Creation, but what is daily done; for the Earth and Water produc'd Animals then without Seed, and so they do still.

Because some, I understand, have been offended at my consistent Denial of all Spontaneous Generation, accounting it too bold and groundless, I shall a little enlarge upon it, and give my Reasons, in order to their Satisfaction.

First, then, I say, such a Spontaneous Generation seems to me to be nothing less than a Creation. For, Creation being not only a Production of a Thing out of Nothing, but also out of indisposed Matter, as may be clearly inferred from the Scripture, and is agreed by all Divines; this Spontaneous Generation, being such a Production, wherein doth it differs from Creation? Or, what did God Almighty do at the first Creation of Animals and Plants, more than what (if this be true) we see every day done? To me, I must confess, it seems almost demonstrable, that whatever Agent can introduce a Form into indisposed Matter, or dispose the Matter in an instant, must be superior to any natural one, not to say Omnipotent.

Secondly, Those who have with the greatest Diligence and Application considered and searched into this Matter, as those eminent Virtuosi, Marcellus Malpighius, Franciscus Redi, John Swammerdam, Lewenhoek, and many others, are unanimously of this Opinion, save that Franc. Redi would except such Insects as are bred in Galls, and some other Excrescencies of Plants. Now their Authority weighs more with me, than the general Vogue, or the concurrent Suffrages of a thousand others who never examined the thing so carefully and circumspectly as they have done, but run away with the Cry of the common Herd of Philosophers.

[There follows a summary of the researches on insects by naturalists such as Swammerdam, Redi, Malphighy and Lister, who found that close study of the plant tissues indeed revealed a mode of entry for the introduction of eggs from which all the larvae subsequently developed.]

Indeed to me it seems unreasonable, that Plants being of a lower Form or Order of Being, should produce Animals; for either they must do it out of indisposed Matter, and then such Production would amount to a Creation, or else they must prepare a fit Matter, which is to act beyond their Strength, there being required to the Preparation of the Sperm of Animals a great Apparatus of Vessels, and many Secretions, Concoctions, Reflexions, Digestions and Circulations of the Matter, before it can be rectified and exalted into so noble a Liquor: And Besides, there must be an Egg, too; for we know *ex ovo omnia*,[2] to the Perfection whereof; there are as many Vessels, and as long a Process required. Now in Plants there are no such Vessels, and consequently no such Preparation of Eggs or Sperm, which are the necessary Principles of Animals.

3. My third Argument against Spontaneous Generation, is, because there are no Arguments or Experiments, which the Patrons of it do or can produce, which do clearly evince it. For the general and vulgar Opinion, that the Heads of Children, or the Bodies of those that do not change their Linen, but wear that which is sweaty and sordid, breeds Lice; or that Cheese of itself breeds Mites or Maggots, I deny, and look upon it as a great Error and Mistake; and do affirm, that all such Creatures are bred of Eggs laid in such sordid Places by some wandring Louse, or Mite, or Maggot. For such Places being most proper for the Hatching and Exclusion of their Eggs, and for the Maintenance of their Young, Nature hath endued them with a wonderful Acuteness of Scent and Sagacity, whereby they can, though far distant, find out, and make towards them. And even Lice and Mites themselves, as now as they seem to be, can, to my knowledge, in no long time march a considerable way to find out a convenient Harbour for themselves.

Here, by the by, I cannot but look upon the Strange Instinct of this noisome and troublesome Creature the Louse, of searching out foul and nasty Cloaths to harbour and breed in, as an Effect of Divine Providence, designed to deterr Men and Women from Sluttishness and Sordidness, and to provoke them to Cleanliness and Neatness. God himself hateth Uncleanliness, and turns away from it, as appears by Deut. chap. xxiii. ver. 12, 13, 14. But if God requires, and is Pleased with bodily Cleanliness, much more is he so with the Pureness of the Mind. Blessed are the pure in Heart, for they shall see God, Matth. v. 10. As for the Generation of Insects out of putrid Matter, the Experiments of Franciscus Redi, and some of our own Virtuosi, give me sufficient Reason to

[2] i.e. ‘all things come from an egg.’ This principle is attributed to William Harvey in his work on embryology: *On the Generation of Animals* (1651). The idea, called ‘biogenesis’, is also expressed as *Omne vivum ex vivo*: all life [is] from life.

reject it. I did but just now mention the quick Scent that Insects have, and the great Sagacity in finding out a proper and convenient Harbour or Matrix, to cherish and hatch their Eggs, and feed their Young: They are so acted and directed by Nature, as to cast their Eggs in such Places as are most accommodate for the Exclusion of their Young, and where there is Food ready for them as soon as they be hatch'd: Nay, it is a very hard matter to keep off such Insects from shedding their Seed in such proper Places. Indeed, if an Insect may be thus equivocally generated, why not sometimes a Bird? a Quadruped, a Man, or even an Universe? Or, why no new Species of Animal now and then? As my learned Friend Dr. Tancred Robinson very well argues in his Letters: For there is as much Art shewn in the Formation of those, as of these.

A fourth and most effectual Argument against Spontaneous Generation, is, that there are no new Species produced, which would certainly now and then, nay, very often happen, were there any such thing. For in such pretended Generations, the Generant or Active Principle is supposed to be the Sun, which being an inanimate Body, cannot act otherwise than by his Heat; which Heat can only put the Particles of the passive Principle into Motion. The passive Principle is putrid Matter; the Particles whereof cannot be conceived to differ in anything, but Figure, Magnitude, and Gravity. Now the Heat putting these Particles in Motion, may indeed gather together those which are homogeneous, or of the same Nature, and separate those that are heterogeneous, or of a different; but that it should so situate, place, and connect them, as we see in the Bodies of Animals, is altogether inconceivable; which, if it could, yet that it should always run them into such a Machine as is already extant, and not often into some new-fashioned one, such as was never seen before, no Reason can be assign.'d or imagined.

[Ray then quotes from the Epicurean Poet Lucretius who argued that it is reasonable and necessary that 'Seeds or Principles determine the Species,' otherwise we would expect to see monsters and chimaeras arising naturally. Ray continues with a lengthy exposition on the raining of frogs, "though it be attested by many and great Authors," to deny the notion that they might have actually been generated in clouds. Similarly he ascribes a natural origin to internal animal parasites, and to tiny 'animalcules' observed in water.]

As for the Worms and other Animals bred in the Intestines of Man and Beast, I have declared my self not to be satisfied of the Ways and Means how their Seeds come to be conveyed into those Places; but yet, that their Generation is Analogous to that of other Creatures of those Kinds, I doubt not. The

Constancy to their Species; their exact Agreement and perpetual Similitude in the Shape and Figure of their Bodies, and all their Parts; their Consistence, Temper, Motion, and other Accidents, are to me little less than a Demonstration, that they are not the Effects of Chance, but the Products of a settled and spermatick Principle. I am at present, 'till better informed, of Opinion, that their Eggs are swallowed with the Meat we eat; and I am the rather induced to think so, because Children in their first Infancy, and as long as they are constantly confined to a Milk Diet, are seldom troubled with them.

Ray quotes from a letter from his "ingenious Friend Dr. Tancred Robinson" who had also concluded that the vast variety of internal parasites found in animals were taken in by ingestion. He also cites the puzzling phenomenon of caterpillars producing maggots that metamorphosed into flies – but he realised that this did not imply a transmutation of species but was in fact another example of parasitism by which the female fly punctures the caterpillar skin with its ovipositor:

So the Ichneumon will convey her Eggs into Caterpillars. The Discovery of the Manner of the Generation of these sorts of Insects I earnestly recommend to all ingenious Naturalists, as a Matter of great Moment. For if this Point be but cleared, and it be demonstrated that all Creatures are generated univocally by Parents of their own Kind, and that there is no such thing as Spontaneous Generation in the World, one main Prop and Support of Atheism is taken away, and their strongest Hold demolished: they cannot then exemplify their foolish Hypothesis of the Generation of Man and other Animals at first, by the Like of Frogs and Insects at this present Day. […]

To what Proofs or Examples of Spontaneous Generation may be brought from Insects bred in the Fruits or Excrescencies of Plants, I have already made Answer in my second Particular, which contains the Testimonies of our best modern Naturalists concerning these Things.

In my Denial of the Spontaneous Generation of Plants, I am not so confident and peremptory; but yet there are the same Objections and Arguments against it, as against that of Animals, viz. because it would be a Production out of indisposed Matter, and consequently a Creation: Or if it be said, there is disposed Matter, prepared by the Earth, or Sun, the Heat, or whatever other Agent you can assign; I reply, this is to make a thing act beyond its Strength, that is, an inferior Nature which hath nothing of Life in it, to prepare Matter for a superior, which hath some Degree of Life; and for the Preparation of which, it hath no convenient Vessels or Instruments. If it could do so, what need of all

that apparatus of Vessels, Preparation of Seed, and, as I also suppose, Distinction of Masculine and Feminine that we see in Plants? I demand farther, whether any of the Patrons of Spontaneous Generation in Plants, did ever see any Herbs or Trees, except those of the Grass-leaved Tribe, come up without two Seed-Leaves; which if they never did or could, it is to me a great Argument that they came all of Seed; there being no Reason else, why they should at first produce two Seed-Leaves different from the Subsequent. And if all these Species which are far the greatest Number) come from Seed, there is not the least reason to think that any of the rest come up spontaneously. And this, with what have written before, may suffice concerning this Point.

From Your Letters

"Thank you for all your hard work in producing such an interesting magazine." MM, Yorkshire

"Thank you for documents. Excellent! Best wishes for your great work." PS, N. Ireland

"Thanks for the magazine which was a surprise arrival today. I'll enjoy reading it. I see from the index that you are a large part of this timely project.

I've just ordered a bunch of books from The Kolbe Center; it is a gesture to support those of my children who are educating the grandchildren here in this evolution soaked country.

Our first governor was Fitzroy, Captain of Darwin's Beagle, (and incidentally a nephew of Castlereagh whose death he eventually imitated.) So we live in a beautiful country yet somehow manage to produce dark movies, high youth suicide, and people who lack gratitude. The religion of the day is climate change, ecology, and social justice." GL, New Zealand

"Never has your publication been more necessary than in these days of darkness. Please keep up your good work." AC, Essex

"Thank you very much for sending me gratis a copy of your Daylight magazine over all these years. I read and pass on to a priest … who is a seminary professor." NC, India

Viruses and the Mystery of Life

Anthony Nevard

The word ‘virus’ comes from the same Latin word meaning ‘poison’. In 1892, Russian botanist Dmitri Ivanovsky discovered an infective material related to the tobacco mosaic disease that could pass through bacterial filters. Before the 1930s, prior to the invention of the electron microscope, no one had actually seen a virus. However, following about 20 years of other research, in 1917 D’Hérelle at the Pasteur Institute in Paris discovered an agent that was invisible and passed through bacterial filters, but was able to infect and kill dysentery bacteria. He used this to successfully treat a man with dysentery, and called the agent ‘bacteriophage’ [bacteria-eater]. Much further research in ‘phage therapy’ has continued in Russia and Eastern Europe, though over the past 100 years in the West the discovery of penicillin and antibiotics has predominated.

> There have been numerous animal and other experimental clinical trials evaluating the efficacy of bacteriophages for various diseases, such as infected burns and wounds, and cystic fibrosis associated lung infections, among others.
>
> Meanwhile, bacteriophage researchers have been developing engineered viruses to overcome antibiotic resistance, and engineering the phage genes responsible for coding enzymes that degrade the biofilm matrix, phage structural proteins, and the enzymes responsible for lysis of the bacterial cell wall. [1]

This Wikipedia article also cites the development in the past 20 years of phages for killing bacteria on meat and dairy products, for disease diagnostic tests, prevention of bacterial infections in horticulture, as biocides for medical surface sterilisation, counter-acting bio-weapons and toxins, as well as applications in a variety of biotechnological and pharmaceutical research. Viruses consist essentially of single of double strand DNA or RNA, enveloped in protein. Bacteriophages are classified with other viruses and identified through their morphology and their type of nucleic acid.

In the Introduction to the 480-page book *The Miracle of Life* [c. 1938] we read that:

> “of that vital spark, as the Greeks called it, which initiated and carries on the process [of life] we are entirely ignorant. That remains the riddle it has always been.” [2]

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1 https://en.wikipedia.org/wiki/Bacteriophage

2 Wheeler, H. (Ed.), *The Miracle of Life*, Odhams Press (1938), p. 7.

The writer marvels at the variety, abundance and continuity of life and the vast volume of publications dealing with it. But how did it all begin?

> One of the latest theories regarding the origin of life relates to the action of bacteriophages or bacterium-eaters … an organism about one ten-thousandth of a millimetre across. The fact that such a speck of life, or almost life, is too small to be seen by the most powerful microscope throws no doubt upon its actual existence. [3]

The paradox of such viruses is their apparently lifeless nature. They may be crystallised out of a solution, in which state they clearly fail to display the seven typical characteristic functions of life: nutrition, respiration, movement, growth, excretion, sensitivity and reproduction. However, when redissolved and if able to enter a suitable living cell, they hijack the contents to make many replicas of themselves, which may later be dispersed within and outside the host organism. The perennial debate in the biology classroom as to whether or not viruses are 'living things' inevitably brings up the question of their origin.

A great deal of research in 'virology' has developed since the 1940s. Viruses are widespread and can affect all living organisms, even being incorporated into their genomes. The question of their origin is still unknown and debatable. In the 1960 the consensus may be summarised thus:

> At one time these were regarded as sub-microscopic forms of life, providing as it were a link between living and non-living matter. It is now known that most viruses are particles consisting of a core of nucleic acid (either RNA or DNA) within a protein shell and in this respect they resemble parts of the cells of which living organisms are composed. No virus is capable of independent life. They can multiply only within the cells of an organism. For these and many other reasons, therefore, viruses are now regarded as having been derived from the cells of living organisms rather than representing simpler and more archaic forms of life. [4]

The current three main evolutionary hypotheses for the origin of viruses are:

- The regressive hypothesis – they were once small parasitic cells that degenerated and lost genes they had needed to survive independently;
- Cellular origin hypothesis – they evolved from bits of DNA and RNA that escaped from cells.
- Co-evolution hypothesis – viruses arose from complex nucleic acid and protein molecules that evolved at the same time as cells and lived on them for billions of years.

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[3] *Ibid.*, Brightwell, L.R., 'The Dawn of Life', p. 10.

[4] Grove and Newell, *Animal Biology*, University Tutorial Press, 7th Edn. (1966), pp.6-7.

Suffice to say, there appears to be no agreement among materialist scientists on this question, which ignores the problem of explaining the origin of DNA and RNA. [5] The subject therefore comes back to that of the origin of life itself.

Spontaneous Generation – "… don't know where, don't know when…"

We take it for granted that 'time's arrow' is irreversible, and something really dead cannot be brought back to life without divine intervention (a miracle). Similarly, we do not expect non-living matter to develop into living forms, even very tiny ones. However, this notion of 'spontaneous generation' was still being debated and investigated by scientists even up to the mid 19th century. It is generally agreed that it was Louis Pasteur's lecture, given at the Sorbonne in 1864 and based on about four years of experimental data, that turned the tide of opinion against this belief.

An extensive biography of Pasteur by Vallery-Radot summarises the background of the theory, which went back to the ancient Greeks, and, as John Ray stressed,[6] was a pillar of atheism. The physicist Jean Biot (founder of the science of polarimetry) had cautioned Pasteur not to oppose the theory.

> It is regrettable that Biot—whose passion for reading was so indefatigable that he complained of not finding enough books in the library at the Institute—should not have thought of writing the history of this question of spontaneous generation. He could have gone back to Aristotle, quoted Lucretius, Virgil, Ovid, Pliny. Philosophers, poets, naturalists, all believed in spontaneous generation. Time went on, and it was still believed in. In the sixteenth century, Van Helmont—who should not be judged by that one instance—gave a celebrated recipe to create mice: any one could work that prodigy by putting some dirty linen in a receptacle, together with a few grains of wheat or a piece of cheese. Some time later an Italian, Buonanni, announced a fact no less fantastic: certain timberwood, he said, after rotting in the sea, produced worms which engendered butterflies, and those butterflies became birds.
>
> Another Italian, less credulous, a poet and a physician, Francesco Redi, belonging to a learned society calling itself The Academy of Experience, resolved to carefully study one of those supposed phenomena of spontaneous generation. In order to demonstrate that the worms found in rotten meat did not appear spontaneously, he placed a piece of gauze over the meat. Flies, attracted by the odour, deposited their eggs on the gauze. From those eggs were hatched the worms, which had until then been supposed to begin life spontaneously in the flesh itself. This simple experiment marked some progress. Later on another Italian, a medical professor of Padua,

[5] See https://en.wikipedia.org/wiki/Virus for more details on this complex subject.
[6] See the article in this issue (p.21) including extracts from Ray's 1692 work.

Vallisneri, recognized that the grub in a fruit is also hatched from an egg deposited by an insect before the development of the fruit.

The theory of spontaneous generation, still losing ground, appeared to be vanquished when the invention of the microscope at the end of the seventeenth century brought fresh arguments to its assistance. Whence came those thousands of creatures, only distinguishable on the slide of the microscope, those infinitely small beings which appeared in rain water as in any infusion of organic matter when exposed to the air? How could they be explained otherwise than through spontaneous generation, those bodies capable of producing 1,000,000 descendants in less than forty-eight hours. [7]

In the 1860s, the foremost French proponent of this theory was naturalist Felix Pouchet, who claimed to have empirically proved the spontaneous generation of microbes from a sterile hay infusion. Following a range of experiments and controls involving boiled solutions and heated air, Pasteur was able to show that active microbes only appeared when the solution was exposed to atmospheric air, which was known to contain spores. A key element to his method was the use of the famous 'swan-necked flask.' One reason for the difficulties in disproving Pouchet's results was that it was then not realised that some spores can survive prolonged heating even at 120º C. [8]

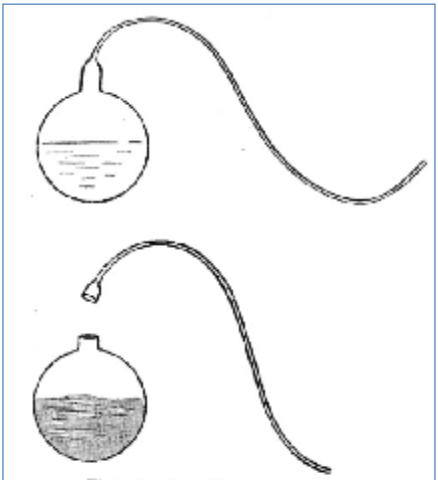

Fig. 35. One of Pasteur's experiments.

When yeast is fusion is boiled in a swan-necked flask, no putrefaction follows, even though it is left open to the air, because any living spores in the air settle in the bend of the U or are caught on the moist sides of the neck. If the neck is broken off, putrefaction sets in, since spores and germs can then reach advantage.

Pasteur concluded his lecture with the following declamation:

And, therefore, gentlemen, I could point to that liquid and say to you, I have taken my drop of water from the immensity of creation, and I have taken it full of the elements appropriated to the development of inferior beings. And I wait, I watch, I question it, begging it to recommence for me the beautiful spectacle of the first creation. But it is dumb, dumb since these experiments were begun several years ago; it is dumb because I have kept it from the only thing man cannot produce, from the germs which float in the air, from Life, for Life is a germ and a germ is Life.

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[7] Vallery-Radot, R., ***The Life of Pasteur***, tr. R.L. Devonshire, Constable & Co., (1911) pp 89-90

[8] ***Diagram from*** Wells, H.G., Huxley, J, Wells, G.P., ***The Science of Life***, Cassell (1931), p. 268.

> Never will the doctrine of spontaneous generation recover from the mortal blow of this simple experiment. [9]

Some historians have alleged that Pasteur's interpretation of his experimental data was unduly influenced by his politico-religious convictions. John Waller, in his book *Fabulous Science*, states that: "During the years of the Enlightenment, the idea of spontaneous generation had become inextricably linked to the notion of evolution." [10] Lamarck, for example, had: "claimed that new life arises continually and spontaneously before embarking on a pre-ordained pathway of progress from simple monads into complex forms such as *Homo sapiens*." [11] Such ideas were associated with a reaction to the monarchy, aristocracy and the Church. Though both Pouchet and Pasteur denied that their respective positions were in conflict with their Catholic Faith, Waller asserts:

> By 1858, the perceived associations between spontaneous generation, evolutionism, and atheism were too strong to be broken. To the Establishment, spontaneous generation and atheism were synonymous, and both had the unmistakeable reek of sedition. [12]

The writer argues a case for the commission appointed by the Académie des Sciences, set up to settle the issue between Pouchet and Pasteur, being a deeply partisan and biased body, which at the time was also "deeply committed to refuting the potentially atheistic evolutionary ideas advanced across the Channel in Charles Darwin's *On the Origin of Species*." [13] Yet despite such arguments, it must be admitted that Pasteur, who openly insisted on life only coming about through the action of the Creator-God, was correct.

In his highly influential book of the 1930s, *The Science of Life*, H.G. Wells gives a one-page outline of the common belief:

> … even by many biologists, that living creatures could so arise – 'spontaneously.' It was believed in not as a miracle, a rare and occasional wonder of nature, but as a fact of everyday experience. […] In the middle of the nineteenth century the genius of Pasteur, with a combination of rigorous experimentation and patient perseverance, finally clinched the matter and proved that all visible living things, *at any rate in the conditions which now obtain in nature*, arise only from others of the same sort. […] We can say now with entirely reasonable confidence that all life which exists today has sprung direct from pre-existing life. [14]

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9 Vallery-Radot, *op. cit.*, p.
10 Waller, J., *Fabulous Science*, Oxford University Press (2002), p. 27
11 Ibid.
12 Ibid., p. 28.
13 Ibid., p. 29
14 Wells, H.G., Huxley, J., Wells, G.P., *The Science of Life*, Cassell (1931), p. 267.

Obviously, knowing its implications for materialist and atheist philosophy, Wells's inserted a 'get-out clause' (my italics inserted). He follows up thus:

> But, of course, this apparent impossibility of spontaneous generation applies only to the world as we know it today. At some time in the remote past, when the earth was hotter and its air and crust differed, physically and chemically, from their present state, it seems reasonable to believe that life must have originated in a simple form from lifeless matter.

Over 30 years later, the popular A-level textbook *Animal Biology* also admits that Pasteur disproved spontaneous generation, but adds:

> …but this is ***negative***, ***inductive*** evidence and some simple forms of life certainly ***must*** have arisen spontaneously, although perhaps under very different conditions, early in the Palaeozoic. For the present, then, biologists are content to accept the ***fact*** of life and are more concerned with the ***way*** in which the various forms of living organisms arose. [15]

Once again, it is admitted that the scientific evidence denies that life springs from non-life. However, we lack empirical proof as we must admit that we cannot carry out every conceivable experiment under all possible conditions. So, in effect, the atheist says to us:

> "Although we admit there is absolutely no scientific evidence for it, somewhere, at some time, somehow, spontaneous generation ***must*** have happened – otherwise we should have to allow for the action of a Creator or Intelligent Designer, which is outside scientific experimentation. So let's all just accept that it did happen, and look at evolutionary changes, for which I believe there actually is some evidence!"

For a more recent detailed study on this subject, I refer to *Things Come To Life – Spontaneous Generation Revisited*, by Henry Harris. This includes many interesting aspects of the history of the scientific study of life and cell theory, which we shall reserve perhaps for a future article. Harris accepts that no experiment has ever demonstrated spontaneous generation, but avers:

> … how life originated in the first place remains an open question. For those who accept divine intervention and the miracles that may flow from it, there is no problem. But those who reject this easy option are faced with a quandary. For if there is no divine intervention, it is difficult to see an alternative to some form of molecular self-assembly. [16]

Just like H.G. Wells some 90 years ago, a man perhaps more famous for his highly imaginative science fiction stories, Harris falls back on the notion of:

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[15] Grove & Newell, op. cit., p.801 [Italics in text quoted].
[16] Harris, H., *Things Come To Life*, Oxford University Press, (2002), p. 157.

> … an extremely gradual process stretching over aeons of geological time and subject to the continuous pressure of Darwinian natural selection. This view of the origin of life has little in common with the historical concept that we have chosen to call spontaneous generation. Indeed the only important similarity between the two is that neither requires the intervention of the supernatural. [17]

As for the other writers just quoted, on the question of the origin of life, empirical science takes a back seat to desperate speculation and fabulous story-telling in their irrational fear of letting 'a divine foot in the door.' After the failure of Miller and Urey's experiments in the early 1950s, based on Oparin and Haldane's ideas of the early earth atmosphere, to synthesise anything close to being self-replicating organic molecules, the materialists seem to have turned back to the ancient Greek idea of 'panspermia.' This is the concept that 'seeds' of simple living organisms evolved elsewhere in the Universe and arrived on our planet destined to kick-start the whole process of evolution. Hence the hyper-excitement engendered by the claimed discovery of even water or methane out in space that 'could be a sign of life'! [18] Yet even if bacteria were found on the Moon or Mars, this would still not prove either that they evolved there or that there was no need for an Intelligent Designer.

Not just a religious and philosophical debate but a very practical issue

With the development of the science of optics in the 17th century, and improvements in light microscopes into the 19th century, came the discovery of groups of single-celled Algae and Protozoa, some motile and bearing cilia or flagella, and even smaller bacteria. Thus began the new science of bacteriology, a highly important advance in the warfare against disease. From a standard work on the history of biology we read:

> In connection with this branch of research there have existed a number of theoretical problems of the greatest significance; the problems of spontaneous generation, fermenting processes, and the origin of various diseases. [19]

Study of the activity of yeasts and bacteria in fermentation and putrefaction was crucial both to the invention of new methods of food preservation and to the prevention and treatment of disease. It was Pasteur who applied his ideas on spontaneous generation to the preservation of milk by heating ("pasteurisation"), improving the manufacture of wine and beer by controlling the conditions of fermentation, and securing immunity from the silk-worm

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17 *Ibid*., p. 158.

18 See this article for a discussion of the problems of panspermia: http://www.ideacenter.org/contentmgr/showdetails.php/id/849

19 Nordenskiöld, E., *The History of Biology*, Tudor Publishing, (1928) p. 430.

disease and chicken cholera by eliminating the micro-organisms that caused them. Nordenskiöld's text summarises Pasteur's contribution:

> Pasteur's views on the origin of the micro-organisms received splendid practical confirmation as a result of the development of modern medicine: antiseptics and aseptics in surgery, disinfection, and the treatment of infectious disease. Owing to these facts, which found fresh confirmation daily, spontaneous generation has entirely ceased to exist as a possibility to be reckoned with in modern biology, nor does it come into serious question when we have to explain actual phenomena. That its theoretical possibility nevertheless still continues to be keenly discussed is due to modern natural-philosophical speculation. [20]

In the English Christian naturalist John Ray's treatise of 1692, he completely rejects the myth of spontaneous generation. It took a devout French Catholic scientist [Pasteur] in 1864 to finally settle the issue. Medical historian Guthrie writes that it was Thomas Anderson, professor of chemistry in Glasgow, who drew antiseptics pioneer Joseph Lister's attention to the work of Pasteur.

> To Lister [1827-1912], Pasteur's discoveries came as a revelation, and he repeatedly, in speech and in writing, acknowledged his debt to Pasteur. From a study of Pasteur's work he deduced that infection in wounds must be analogous to putrefaction in wine. Lister therefore sought for a means of destroying the organisms, and for this purpose he selected carbolic acid. [21]

Lister's first trials of his antiseptic system for surgery were made in 1865. On the occasion of Pasteur's seventieth birthday (1892) Lord Lister said: "Truly there does not exist in the wide world an individual to whom medical science owes more than to you." Pasteur also paid tribute to Lister, expressing his belief that "… science and peace must triumph over ignorance and war, that nations will unite not to destroy but to instruct one another…" [22]

Pasteur's followed his successful work on anthrax immunity with the fight against rabies. However, he could not detect the infecting organism, as his biography entry by Isaac Asimov [another science fiction writer] reports:

> He was puzzled in this investigation by not being able to locate the actual germ. This did not shake his faith in the germ theory, however. He suggested that the germ was too small to be seen in the microscope. In this he was correct and this observation foreshadowed the study of viruses that Stanley was to bring to a climax a half century later. [23]

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[20] Ibid., p. 434.
[21] Guthrie, D., *A History of Medicine*, Thomas Nelson (revised edn., 1958), p. 324
[22] Ibid., p. 285.
[23] Asimov, I, *Biographical Encyclopaedia of Science and Technology*, Pan (1975), p. 373

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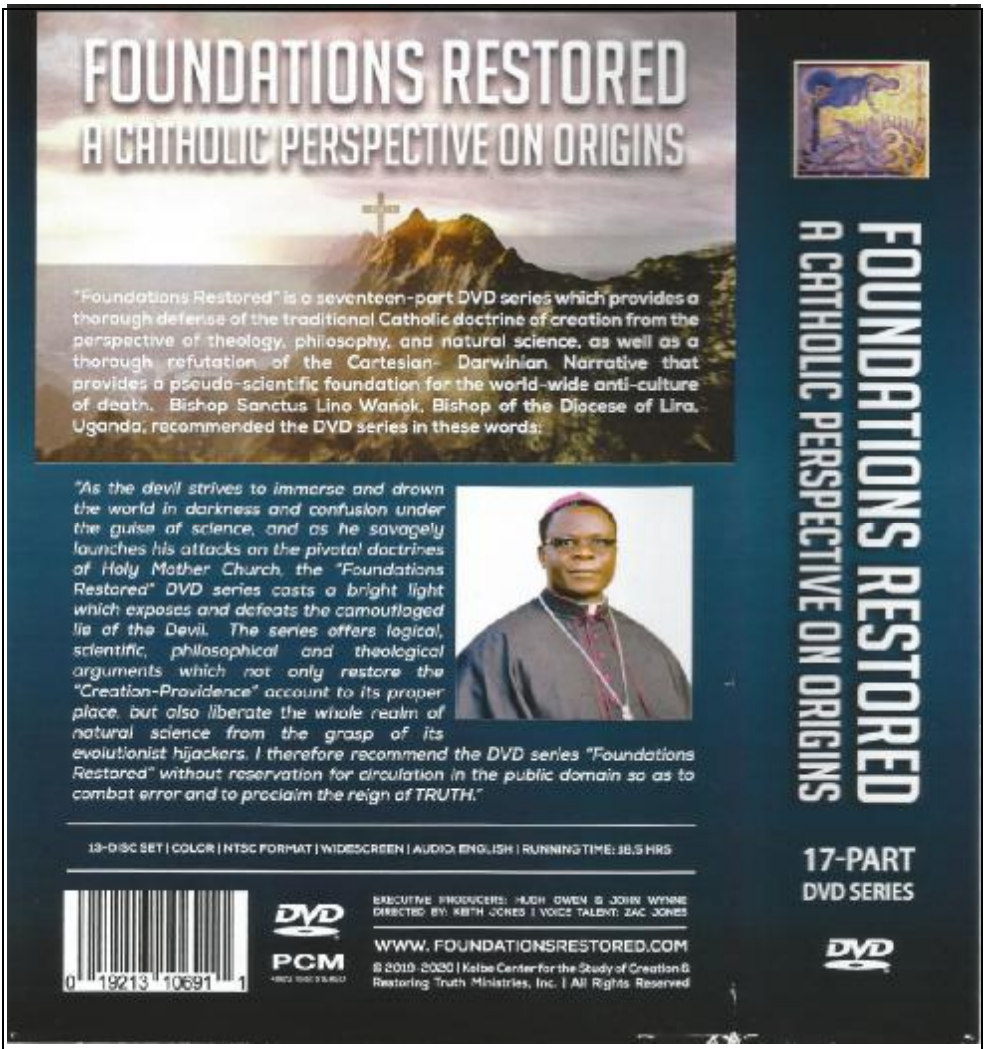

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